

**REMARKS**

Claims 16-30 are pending in this application. By the Office Action, claims 18, 19, 21, and 27 are objected to; and claims 16-30 are rejected under 35 U.S.C. §103. By this Amendment, claims 16-30 are amended to address informalities and to conform to U.S. practice. No new matter is added.

I. Claim Objection

Claims 18, 19, 21, and 27 are objected to for asserted informalities. By this Amendment, the claims are amended to address the grounds of the rejection. Reconsideration and withdrawal of the objection are respectfully requested.

II. Rejections Under §103

A. Le

Claims 16-24 and 26-29 are rejected under 35 U.S.C. §103(a) over Le. Applicants respectfully traverse this rejection with respect to the amended claims.

The claimed invention is directed to a process for controlled radical polymerization using an organosulfur reversible chain transfer agent which consists in preparing polymers having a molar weight of greater than 100 000 g/mol, with a polydispersity index of less than 1.2 for molar weights of less than 200 000 g/mol and of less than 1.4 for molar weights of greater than 200 000 g/mol, with a degree of conversion of monomer of greater than 75% and a polymerization time of less than 8 h, said process comprising controlling the flux of initiator radicals in the polymerization medium. See claim 16. The claimed invention is also directed to a polymer of acrylamide or of its derivatives having a number-average molar weight of greater than or equal to 100 000 g/mol, wherein it has a polydispersity index of less than 1.2 when the molar weight is absolutely less than 200 000 g/mol and in that it has a polydispersity index of less than 1.4 when the molar weight is greater than 200 000 g/mol. See claim 29. Such a process and polymer are not taught or suggested by Le.

Le discloses a free radical polymerization process, and polymers made thereby, in which the process comprises preparing polymer of general Formula (A) and Formula (B) comprising contacting: (i) a monomer selected from the group consisting of vinyl monomers, maleic anhydride, N-alkylmaleimide, N-arylmaleimide, dialkyl fumarate and cyclopolymerizable monomers; (ii) a thiocarbonylthio compound selected from Formula (C) and Formula (D) having a chain transfer constant greater than about 0.1; and (iii) free radicals produced from a free radical source. The polymer of Formula (A) is made by contacting (i), (ii) C and (iii) and the polymer of Formula (B) is made by contacting (i), (ii) D, and (iii). The process further comprises (iv) controlling the polydispersity of the polymer being formed by varying the ratio of the number of molecules of (ii) to the number of molecules of (iii). See Le at Abstract. Such a process would not have rendered obvious the claimed invention.

An aspect of the claimed invention is that the flux of the initiator radicals in the polymerization medium is controlled. As a result of that control, the polymer product obtained from the process has at least the following three features:

- a molar weight of greater than or equal to 100,000 g/mol;
- a polydispersity index of less than 1.2 for molar weights less than 200,000 g/mol and less than 1. for molar weights greater than 200,000 g/mol;
- a degree of conversion of monomer of greater than 75%; and
- the polymer is obtained within a polymerization time of less than 8 hours.

However, the combination of at least these four polymer and process properties is not taught or suggested by Le, and thus would not have been obvious over Le.

The Office Action incorrectly asserts that Le discloses polymers and processes having the claimed properties. For example, the Office Action cites to Le at paragraphs [0088], [0115], and [0128] and Example 34 in Table 10 for processes and polymer products similar to the claimed invention. The Office Action argues that Le Examples 34 exhibits a

polydispersity substantially similar to the claimed polydispersity, and that the claimed invention would have been obvious over Example 34.

Applicants disagree. Example 34 in Le may have some of the claimed properties, but Example 34 does not exhibit the degree of conversion of monomer to polymer of greater than 75%, as claimed. Referring to Table 10 in Le, Example 34 exhibits a degree of conversion ranging only from 12.9% to 31.3%. These degrees of conversion are less than half the required degree of conversion of greater than 75%. Accordingly, the process and polymer disclosed in Example 34 of Le is not "very similar" to the claimed invention, but rather is entirely different from and far inferior to the claimed invention.

Le does not teach or suggest how the disclosed process could or should be modified to achieve a degree of conversion of monomer of greater than 75%, as claimed. Instead, Le discloses a process with a far lower degree of conversion. It would not have been obvious to one of ordinary skill in the art how to modify the disclosed process to increase the degree of conversion to the level of at least 75%, as claimed, while maintaining the other polymer and process characteristics.

These distinctions between the claimed invention and Le are also discussed in the present specification, at page 3, lines 10-32, with reference to the disclosure of PCT Publication No. WO 98/01478. Le is a counterpart to PCT Publication No. WO 98/01478.

Accordingly, claims 16 and 29 and their dependent claims are patentable over Le.

In addition, claim 17 is further patentable over Le based on its additional limitations. Claim 17 depends from claim 16, and further specifies that the control of the flux of initiator radicals is achieved by:

- i) maintaining a uniform polymerization temperature  $T_1$  during the initiation period, and
- ii) continuing the polymerization, the polymerization temperature being allowed to fall to the temperature  $T_2$ ,

it being understood that  $T_1$  and  $T_2$  correspond to the following equations (1) and (2):

$$T_1 > T_2 \quad (1) \text{ and}$$

$$T_1 - T_2 \leq 50^\circ\text{C} \quad (2).$$

The Office Action asserts that the limitations of claim 17 would have been obvious over Le because adjustment of the temperature would have been obvious based on different initiators or the like. Applicants disagree.

Claim 17 specifies two different temperatures used in the polymerization process. These different temperatures are used as one route to control the flux of initiator radicals, and are not merely alternative temperatures used depending upon a specific selected initiator. Le does not teach or suggest a polymerization process using two different temperatures, as claimed, and thus would not have rendered obvious the additional limitations of claim 17.

For at least these reasons, the claimed invention would not have been obvious over Le. Reconsideration and withdrawal of the rejection are thus respectfully requested.

B. Le and Takaki

Claims 25 and 30 are rejected under 35 U.S.C. §103(a) over Le. Applicants respectfully traverse this rejection with respect to the amended claims.

The rejection of independent claims 16 and 29 over Le alone is discussed above. Takaki is cited for its disclosure of the initiating agent 2,2'-azobis(2,4-dimethylvaleronitrile) (claim 25) and the polymer being an N-acryloylmorpholine homopolymer (claim 3). Takaki is cited for these disclosures.

Regardless of the disclosure of Takaki, any combination of Le and Takaki fails to teach or suggest all of the limitations of independent claims 16 and 29, as discussed in detail above. Accordingly, Takaki fails to overcome the deficiencies of Le, and the combination of references would not have rendered obvious the claimed invention.


For at least these reasons, the claimed invention would not have been obvious over Le and Takaki. Reconsideration and withdrawal of the rejection are thus respectfully requested.

III. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of the application are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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